



# PRODUCT/PROCESS CHANGE NOTIFICATION

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PCN IPG-DIS/14/8398  
Dated 26 Mar 2014

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## **Selected Power Rectifiers**

**Additional Assembly and Test Location in China for D2PAK package**

**Table 1. Change Implementation Schedule**

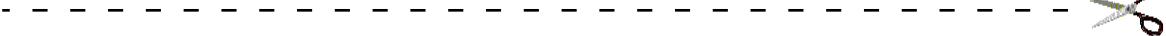
Forecasted implementation date for change	19-Mar-2014
Forecasted availability date of samples for customer	19-Mar-2014
Forecasted date for <b>STMicroelectronics</b> change Qualification Plan results availability	19-Mar-2014
Estimated date of changed product first shipment	25-Jun-2014

**Table 2. Change Identification**

Product Identification (Product Family/Commercial Product)	Selected Power Rectifiers
Type of change	Assembly additional location
Reason for change	to increase the manufacturing capacity
Description of the change	see attached
Change Product Identification	marking, internal codification, QA number
Manufacturing Location(s)	

**Table 3. List of Attachments**

Customer Part numbers list	
Qualification Plan results	



Customer Acknowledgement of Receipt		PCN IPG-DIS/14/8398
Please sign and return to STMicroelectronics Sales Office		Dated 26 Mar 2014
<input type="checkbox"/> Qualification Plan Denied <input type="checkbox"/> Qualification Plan Approved  <input type="checkbox"/> Change Denied <input type="checkbox"/> Change Approved	Name:	
	Title:	
	Company:	
	Date:	
	Signature:	
Remark ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... .....		

## DOCUMENT APPROVAL

Name	Function
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Duclos, Franck	Product Manager
Cazaubon, Guy	Q.A. Manager

## PCN Product/Process Change Notification

### Selected Power Rectifiers Additional Assembly and Test Location in China for D2PAK package

<b>Notification number:</b>	IPG-DIS/14/8398	<b>Issue Date</b>	19/03/2014
<b>Issued by</b>	Aline AUGIS		
<b>Product series affected by the change</b>	STPS10150CG-TR STPS10170CG-TR STPS10H100CG-TR STPS10L25G-TR STPS10L40CG-TR STPS10LCD80CG-TR STPS10M80CG-TR STPS10SM80CG-TR STPS1545CG-TR STPS1545G STPS1545G-TR STPS15LCD80CG-TR STPS15M80CG-TR STPS15SM80CG-TR STPS16170CG-TR STPS16H100CG-TR STPS20150CG STPS20150CG-TR STPS20170CG-TR STPS2045CG-TR STPS20H100CG STPS20H100CG-TR STPS20L15G-TR STPS20L45CG-TR STPS20LCD80CG-TR STPS20M100SG-TR STPS20M80CG-TR STPS20SM100SG-TR STPS20SM60CG-TR STPS20SM60SG-TR STPS20SM80CG-TR STPS2545CG-TR STPS30150CG-TR STPS30170CG-TR STPS3045CG-TR STPS30LCD80CG-TR STPS30SM100SG-TR STPS30SM80CG-TR STPS40LCD80CG-TR STPS745G-TR STPS8H100G STPS8H100G-TR STTH1002CG-TR STTH10P04SG-TR STTH10R04G-TR STTH1302CG-TR STTH15P035SG-TR STTH1602CG-TR STTH16R04CG-TR STTH2002CG STTH2002CG-TR STTH2002G-TR STTH2003CG STTH2003CG-TR STTH2004SG-TR STTH20L03CG-TR STTH20P035SGTR STTH20R04G-TR STTH802G STTH802G-TR STTH803G-TR STTH8R04G-TR		

(1) IPG: Industrial & Power Group - ASD: Application Specific Device – IPAD™: Integrated Passive and Active Devices

<b>Type of change</b>	Additional assembly and test location
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**Description of the change**

STMicroelectronics decided to **expand the manufacturing capacity Power Rectifiers** housed in **D2PAK package** with one **additional assembly and test plant** in China.

In order to cover both manufacturing locations D2PAK package outline dimensions, the package dimension table of the impacted products will be updated as below:

NEW D2PAK dimensions specified in datasheets				Original D2PAK dimensions specified in datasheets				
Ref.	Dimensions		Ref.	Dimensions		Ref.	Dimensions	
	Millimeters			Millimeters			Millimeters	
	Min.	Max.		Min.	Max.		Min.	Max.
A	4.36	4.6	A	4.40	4.60	A	4.40	4.60
A1	0	0.23	A1	2.49	2.69	A1	2.49	2.69
b	0.7	0.93	A2	0.03	0.23	A2	0.03	0.23
b2	1.14	1.7	B	0.70	0.93	B	0.70	0.93
c	0.38	0.694	B2	1.14	1.70	B2	1.14	1.70
c2	1.19	1.36	C	0.45	0.60	C	0.45	0.60
D	8.6	9.35	C2	1.23	1.36	C2	1.23	1.36
D1	6.9	-	D	8.95	9.35	D	8.95	9.35
E	10	10.55	E	10.00	10.40	E	10.00	10.40
E1	8.1	-	G	4.88	5.28	G	4.88	5.28
e	2.54 typ.		L	15.00	15.85	L	15.00	15.85
H	15	15.85	L2	-	-	L2	1.27	1.40
L	1.9	2.79	L3	0.25 typ.	-	L3	1.40	1.75
L1	-	1.65	L4	4.78	5.28	M	2.40	3.20
L2	-	1.78				R	0.40 typ.	-
L3	0.25 typ.					V2	0°	8°
L4	4.78	5.28						

**Reason for change**

This additional multi-sourcing will increase our **manufacturing capacity** for a better service on the considered **Power Rectifier** devices.

**Former versus changed product:**

The changed products do not present modified electrical, parameters, leaving unchanged the current information published in the product datasheet, except for the POA.

The Moisture Sensitivity Level of the part (according to the IPC/JEDEC JSTD-020D standard) remains unchanged.

The footprint recommended by ST remains the same.

There is no change in the packing modes and the standard delivery quantities either.

**Disposition of former products**

As the purpose is to expand the manufacturing capacity, shipments of the products processed in the initial test and assembly site will continue.

(1) IPG: Industrial & Power Group - ASD: Application Specific Device – IPAD™: Integrated Passive and Active Devices

**Marking and traceability**

Parts produced in the new China location are differentiated by their **marking** as indicated below

Assembly location	Assy plant code	Date code marking	
		Assy year	Assy week
China 1 (ST)	<b>GK</b>	Y (1 digit indicating the year)	<b>WW</b> (2 digits indicating the week number)
<b>New location : China 2 (subco)</b>	<b>GE</b>		

**Traceability** for the implemented change will be ensured by an **internal codification** and by the **Q.A. number**.

**Qualification complete date**

**August 2011**

**Forecasted sample availability**

Product family	Sub-family	Commercial part Number	Availability date
<b>Diodes &amp; Rectifiers</b>	All	All	Upon request with from 4 to 8 weeks of delay

**Change implementation schedule**

Sales types	Estimated production start	Estimated first shipments
<b>All</b>	<b>Week 15-2014</b>	<b>Week 25-2014</b>

**Comments:**

**Customer's feedback**

Please contact your local ST sales representative or quality contact for requests concerning this change notification.  
 Absence of acknowledgement of this PCN within 30 days of receipt will constitute acceptance of the change  
 Absence of additional response within 90 days of receipt of this PCN will constitute acceptance of the change

**Qualification program and results**

**11143QRP-Rev 1.0**

**Qualification of  
New ECOPACK®2 resin for Rectifiers products  
in D<sup>2</sup>PAK package at Subcontractor in China**

General Information	
<b>Product Line</b>	Power Schottky & Ultrafast Bipolar up to 400V (BU78)
<b>Product Description</b>	Rectifiers in D <sup>2</sup> PAK package: New ECOPACK®2 resin
<b>Product Group</b>	APM
<b>Product division</b>	ASD & IPAD
<b>Package</b>	D <sup>2</sup> PAK
<b>Maturity level step</b>	Qualified

Locations	
<b>Wafer fab</b>	STM Tours (France) STM Ang Mo Kio (Singapore)
<b>Assembly plant</b>	Subcontractor (China)
<b>Reliability Lab</b>	STM Tours (France)

**DOCUMENT INFORMATION**

Version	Date	Pages	Prepared by	Comment
1.0	29-Jul-2011	8	I. BALLON	First issue Qualification of Power Schottky & Bipolar up to 400V (BU78) in D <sup>2</sup> PAK package: New ECOPACK®2 resin  (Reference document: Product Information Letter PIL APM-DIS/11/6705, APM-DIS/11/6706, APM-DIS/11/6707, APM-DIS/11/6708)

Note: This report is a summary of the reliability trials performed in good faith by STMicroelectronics in order to evaluate the potential reliability risks during the product life using a set of defined test methods.  
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## **1 APPLICABLE AND REFERENCE DOCUMENTS**

Document reference	Short description
JESD47	Stress-Test-Driven Qualification of Integrated Circuits
FMEA	8343019
RER	1051002

## **2 GLOSSARY**

DUT	Device Under Test
PCB	Printed Circuit Board
SS	Sample Size
HTRB	High Temperature Reverse Bias
TC	Temperature Cycling
PCT	Pressure Cooker Test (Pressure Pot)
THB	Temperature Humidity Bias
SD	Solderability

## **3 RELIABILITY EVALUATION OVERVIEW**

### **3.1 Objectives**

The objective of this report is to qualify new “Halogen-Free” encapsulation molding compound for Rectifiers housed in D<sup>2</sup>PAK package at Subcontractor in China.

The encapsulation molding compound chosen for the qualification is the same, which have been qualified at ST Shenzhen plant (China).

The reliability methodology used in this qualification follows the JESD47-G: «Stress Test Driven Qualification Methodology».

### **3.2 Conclusion**

The perimeter addressed in this campaign qualifies the production of Rectifiers housed in D<sup>2</sup>PAK package with the new “Halogen-Free” encapsulation molding compound.  
Reliability tests are positive.

Qualification Plan requirements have been fulfilled without exception. It is stressed that reliability tests have shown that the devices behave correctly against environmental tests (no failure). Moreover, the stability of electrical parameters during the accelerated tests demonstrates the ruggedness of the products and safe operation, which is consequently expected during their lifetime.

## 4 DEVICE CHARACTERISTICS

### 4.1 Device description

- Rectifiers (Power Schottky & Ultrafast Bipolar up to 400V) in D<sup>2</sup>PAK package with new ECOPACK®2 Molding compound assembled at subcontractor in China.

### 4.2 Construction note

<b>Power Schottky &amp; Ultrafast Bipolar up to 400V in D<sup>2</sup>PAK package with new ECOPACK®2 Molding compound</b>	
<b>Wafer/Die fab. information</b>	
Wafer fab manufacturing location	STM Ang Mo Kio (Singapore) STM Tours (France)
<b>Wafer Testing (EWS) information</b>	
Electrical testing manufacturing location	STM Ang Mo Kio (Singapore) STM Tours (France)
<b>Assembly information</b>	
Assembly site	Subcontractor in China
Package description	D <sup>2</sup> PAK
Molding compound	<b>ECOPACK®2</b> ("Halogen-free") molding compound
Frame material	Copper
Die attach process	Soft solder
Die attach material	Preform Pb/Sn/Ag
Wire bonding process	Ultra Sonic wire bonding
Wires bonding materials	Aluminium
Lead finishing process	Plating
Lead finishing material	Tin (Sn 100%)
<b>Final testing information</b>	
Testing location	Subcontractor in China



## 5 TESTS RESULTS SUMMARY

### 5.1 Test vehicles

Lot #	Process/ Package	Product Family	Product
1	D <sup>2</sup> PAK	Power Schottky	STPS3045CG-TR
2			STPS30170CG-TR
3		Ultrafast Bipolar	STTH2004SG-TR

### 5.2 Test plan and results summary

#### Die Oriented Tests

Test	PC	Std ref.	Conditions	SS	Steps	Failure/SS		Note
						Lot 2	Lot 3	
HTRB	N	JESD22 A-108	T <sub>j</sub> , V <sub>r</sub> = 0.8xV <sub>rrm</sub>	154	168 H	0/77	0/77	
					500 H	0/77	0/77	
					1000 H	0/77	0/77	

#### Package Oriented Tests

Test	PC	Std ref.	Conditions	SS	Steps	Failure/SS			Note						
						Lot 1	Lot 2	Lot 3							
THB	N	JESD22 A-101	T <sub>a</sub> = 85°C, RH = 85%, V <sub>r</sub> = 0.8xV <sub>rrm</sub> or 100V max	73	168 H	0/24	0/24	0/25							
					500 H	0/24	0/24	0/25							
					1000 H	0/24	0/24	0/25							
TC	N	JESD22 A-104	T <sub>a</sub> = -65°C to 150°C	75	SS	Steps	Failure/SS			Note					
							100 cy	0/25	0/25		0/25				
												500 cy	0/25	0/25	0/25
PCT	N	JESD22 A-102	121°C, 100% RH, 2bars	75	96hrs	Failure/SS			Note						
						0/25	0/25	0/25							
Solderability	N	J-STD-002	245°C SnAgCu bath Dry aging	30	SS	Steps	Failure/SS			Note					
							245°C SnAgCu bath Wet aging	0/10	0/10		0/10				
												220°C SnPb bath Dry aging	0/10	0/10	0/10
							220°C SnPb bath Wet aging	0/10	0/10		0/10				
							220°C SnPb bath Wet aging	0/10	0/10		0/10				

## 6 ANNEXES

### 6.1 Device details

#### 6.1.1 Pin connection

Package	Pin connection	
	For Single diode configuration STPSxxxxSG STTHxxxxSG	For Double diodes configuration STPSxxxxCG STTHxxxxCG
D <sup>2</sup> PAK	 	 

### 6.1.2 Package outline/Mechanical data

- D<sup>2</sup>PAK

D<sup>2</sup>PAK dimensions

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.26	4.66	0.168	0.183
A1	0.00	0.25	0.000	0.010
b	0.70	0.93	0.028	0.037
b2	1.14	1.70	0.045	0.067
c	0.38	0.694	0.015	0.027
c2	1.19	1.36	0.047	0.053
D	8.60	9.35	0.339	0.368
D1	6.90	-	0.272	-
E	10.00	10.55	0.394	0.415
E1	8.10	-	0.319	-
e	2.54 typ.		0.100	
H	15.00	15.85	0.591	0.624
L	1.90	2.79	0.075	0.110
L1	-	1.65	-	0.065
L2	-	1.78	-	0.070
L3	0.25 typ.		0.010	
L4	4.78	5.28	0.188	0.208

## 6.2 Tests description

Test name	Description	Purpose
<b>Die Oriented</b>		
<b>HTRB</b> High Temperature Reverse Bias  <b>HTFB / HTGB</b> High Temperature Forward (Gate) Bias	The device is stressed in static configuration, trying to satisfy as much as possible the following conditions: low power dissipation; max. supply voltage compatible with diffusion process and internal circuitry limitations;	To determine the effects of bias conditions and temperature on solid state devices over time. It simulates the devices' operating condition in an accelerated way.  To maximize the electrical field across either reverse-biased junctions or dielectric layers, in order to investigate the failure modes linked to mobile contamination, oxide ageing, layout sensitivity to surface effects.
<b>Package Oriented</b>		
<b>TC</b> Temperature Cycling	The device is submitted to cycled temperature excursions, between a hot and a cold chamber in air atmosphere.	To investigate failure modes related to the thermo-mechanical stress induced by the different thermal expansion of the materials interacting in the die-package system. Typical failure modes are linked to metal displacement, dielectric cracking, molding compound delamination, wire-bonds failure, die-attach layer degradation.
<b>THB</b> Temperature Humidity Bias	The device is biased in static configuration minimizing its internal power dissipation, and stored at controlled conditions of ambient temperature and relative humidity.	To evaluate the package moisture resistance with electrical field applied, both electrolytic and galvanic corrosion are put in evidence.
<b>AC/PCT</b> Auto Clave (Pressure Pot)	The device is stored in saturated steam, at fixed and controlled conditions of pressure and temperature.	To investigate corrosion phenomena affecting die or package materials, related to chemical contamination and package hermeticity.

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## Public Products List

PCN Title : Selected Power Rectifiers//Additional Assembly and Test Location in China for D2PAK package  
PCN Reference : IPG-DIS/14/8398  
PCN Created on : 20-MAR-2014

Subject : Public Products List

Dear Customer,

Please find below the Standard Public Products List impacted by the change:

### ST COMMERCIAL PRODUCT

STPS10150CG-TR	STPS10170CG-TR	STPS10H100CG-TR
STPS10L25G-TR	STPS10L40CG-TR	STPS10M80CG-TR
STPS10SM80CG-TR	STPS1545CG-TR	STPS1545G
STPS1545G-TR	STPS15M80CG-TR	STPS15SM80CG-TR
STPS16170CG-TR	STPS16H100CG-TR	STPS20150CG
STPS20150CG-TR	STPS20170CG-TR	STPS2045CG-TR
STPS20H100CG	STPS20H100CG-TR	STPS20L15G-TR
STPS20L45CG-TR	STPS20M100SG-TR	STPS20M80CG-TR
STPS20SM100SG-TR	STPS20SM60CG-TR	STPS20SM60SG-TR
STPS20SM80CG-TR	STPS2545CG-TR	STPS30150CG-TR
STPS30170CG-TR	STPS3045CG-TR	STPS30SM100SG-TR
STPS30SM80CG-TR	STPS745G-TR	STPS8H100G
STPS8H100G-TR	STTH1002CG-TR	STTH10R04G-TR
STTH1302CG-TR	STTH1602CG-TR	STTH16R04CG-TR
STTH2002CG	STTH2002CG-TR	STTH2002G-TR
STTH2003CG	STTH2003CG-TR	STTH20L03CG-TR
STTH20R04G-TR	STTH802G	STTH802G-TR
STTH803G-TR	STTH8R04G-TR	

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## Commercial Product & Customer Part Number List

Customer Name : EBV

PCN Title : Selected Power Rectifiers//Additional Assembly and Test Location in China for D2PAK package

PCN Reference : IPG-DIS/14/8398

PCN Created on : 20-MAR-2014

Subject : Customer Part Number List

Dear Customer,

Please find below the list of Part Numbers you have ordered within the last two (2) years which are impacted by this change.

### ST COMMERCIAL PRODUCT

STPS16H100CG-TR  
STTH2002CG-TR  
STTH802G  
STPS2045CG-TR  
STTH2002G-TR  
STTH2003CG-TR  
STPS10H100CG-TR  
STPS20150CG-TR  
STPS20M100SG-TR  
STTH2003CG  
STPS1545CG-TR  
STPS20H100CG-TR  
STPS20L15G-TR  
STPS30170CG-TR  
STPS30SM100SG-TR  
STPS8H100G  
STTH2002CG  
STPS20H100CG  
STTH1602CG-TR  
STPS1545G-TR  
STPS3045CG-TR  
STPS8H100G-TR  
STTH1002CG-TR  
STPS10L40CG-TR  
STPS16170CG-TR  
STPS20150CG

### CUSTOMER PART NUMBER

STPS16H100CG-TR  
STTH2002CG-TR  
  
STPS2045CG-TR  
  
STTH2003CG-TR  
  
STPS20150CG-TR  
  
STTH2003CG  
STPS1545CG-TR  
STPS20H100CG-TR  
STPS20L15G-TR  
  
STPS8H100G  
STTH2002CG  
STPS20H100CG  
STTH1602CG-TR  
STPS1545G-TR  
STPS3045CG-TR  
STPS8H100G-TR  
STTH1002CG-TR  
STPS10L40CG-TR  
  
STPS20150CG

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